OPEN AXIALLY SYMMETRIC ION SPECTROMETER

A letter of intent for an experiment at the
Relativistic Heavy Ion Collider

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Abstract

The Open Axially Symmetric Ion Spectrometer experiment at RHIC is designed as a flexible multipurpose detector capable of simultaneously measuring a number of potential signatures of the quark gluon plasma. The experiment is designed to accept the full luminosity of the machine for all beam species. The open geometry configuration and the modular construction of the experiment provides maximum flexibility. Three main physics programs are pursued in the same experiment under various trigger conditions. First, identified particle spectra in the central region are measured, covering the p_T range from approximately 100 MeV/c up to tens of GeV/c. Low-p_T spectra of $\pi^{\pm}$, $K^{\pm}$, p and $\bar{p}$, together with high-p_T hadron spectra associated with jets are measured. The good momentum resolution is used for HBT measurements and for the search for narrow resonances (e.g. ϕ). Secondly, the experiment will be able to reconstruct electron pairs over a range including the anomalous region of a few hundred MeV, the resonance region (ω and ϕ), and the J/Ψ. The third major program is the measurement of high-p_T electromagnetic showers in the calorimeter, which will allow us to identify high-p_T single photons, π^0, η, and η', and to measure their p_T spectra. Many of these different channels are available simultaneously within the detector, permitting us to examine correlations between signatures .